

## Limits and Continuity

For the following problems, sketch a graph of a function that has the indicated features and write an equation for the function that has these features. The function may be a piecewise function.

1. The function is continuous at $x=3$ , but has a cusp there.	2. The function has a limit as $x$ approaches 3 but fails to be continuous there because $f(3)$ is undefined.
3. The function has a limit as $x$ approaches $-1$ , has a value for $f(-1)$ , but still is not continuous there.	4. The function has no limit as $x$ approaches 0, but $f(0)=3$ .
5. The function has a limit of 2 as $x$ approaches 0 from the right, but has no limit as $x$ approaches 0 from the left.	6. The function has a step (or jump) discontinuity at $x=1$ , and $f(1) = 6$ .
7. The function has a limit as $x$ approaches 2 of 5, but $f(2) = 4$ .	8. The function has a right-hand limit of $-2$ and a left-hand limit of 2 as $x$ approaches $-1$ .